Claims

We claim:

1. A method for processing a plurality of videos, comprising:

acquiring, in parallel, a plurality of compressed videos, in which compressed frames of each input video are acquired at a fixed sampling rate;

applying, concurrently and in parallel, joint analysis to the plurality of compressed videos to determine a variable and non-uniform temporal sampling rate for each compressed video, so that a combined distortion is minimized while a combined frame rate constraint is satisfied for the plurality of compressed videos; and

sampling compressed frames of each compressed video at the associated variable and non-uniform temporal sampling rate to produce a plurality of compressed output videos having variable temporal resolutions.

2. The method of claim 1, further comprising:

storing the plurality of compressed output videos in a persistent memory.

3. The method of claim 1, in which the compressed frames are intra-frames.

4. The method of claim 3, in which the compressed videos are JPEG videos.

5. The method of claim 3, in which the compressed videos are MPEG videos.

6. The method of claim 1, further comprising:

acquiring the plurality of compressed videos with a plurality of surveillance cameras.

7. The method of claim 1, further comprising:

acquiring the plurality of compressed videos with a plurality of broadcast studio cameras.

8. The method of claim 3, in which the combined distortion includes a temporal distortion.

9. The method of claim 8, in which the temporal distortion is determined from compressed-domain information of the intra-frames.

10. The method of claim 9, in which the compressed domain information includes DCT coefficients.

11. The method of claim 1, further comprising:

decoding partially the plurality of compressed videos before applying the joint analysis.

12. The method of claim 1, in which the compressed frames are inter-frames.

13. The method of claim 12, in which the temporal distortion is determined directly from motion vectors in the inter-frames.

14. The method of claim 12, in which the compressed frames are MPEG-1/2 P/B-frames.

15. The method of claim 12, in which the compressed frames are MPEG-4 P/B-video object planes.

16. The method of claim 12, in which the combined distortion includes a temporal distortion.

17. The method of claim 16, in which the temporal distortion $E\{\Delta^2 z_{i,k}\}$ between a frame i and frame k is estimated by $E\{\Delta^2 z_{i,k}\} = \sigma_{x_i}^2 \sigma_{\Delta x_{i,k}}^2 + \sigma_{y_i}^2 \sigma_{\Delta y_{i,k}}^2$, where $(\sigma_{x_i}^2, \sigma_{y_i}^2)$ represent a variances for x and y spatial gradients in frame i, and $(\sigma_{\Delta x_{i,k}}^2, \sigma_{\Delta y_{i,k}}^2)$ represent variances for motion vectors between the frame i and frame k in x and y direction.

18. The method of claim 17, wherein spatial gradients are determined directly from DCT coefficients in the frames.

19. The method of claim 12, further comprising:

transcoding the output compressed videos.